

**Claims**

1. A method for the desulphurization of the circulation of chemicals in a sulphate pulp mill, comprising
  - 5 - collecting concentrated odorous gases that contain sulphur compounds and
  - combusting them to oxidize the sulphur compounds,  
**characterized in that**
    - the concentrated odorous gases are combusted at an air index below one so that at least an essential part of the sulphur compounds are oxidized into elemental sulphur, and
    - 10 - the elemental sulphur is recovered in liquid or solid form.
2. A method according to claim 1, **characterized** in that the air index of the combustion is about 0.4 – 0.9.
- 15 3. A method according to claim 1 or 2, **characterized** in that the temperature of the combustion is about 1400 to 1800 °C.
4. A method according to claim 1, 2 or 3, **characterized** in that the desulphurization is integrated into the odorous gas exhaust system of the pulp mill.
- 20 5. A method according to any one of the preceding claims, **characterized** in the sulphur is condensed from the odorous gases after the combustion of the gases.
6. A method according to any one of the preceding claims, **characterized** in that the water  
25 of the boiler or cooling water circulation of the pulp mill is used to condense the sulphur.
7. A method according to any one of the preceding claims, **characterized** in that part of the collected odorous gases are conducted to Claus combustion and part of the sulphur compounds from the Claus combustion are conducted to conventional odorous gas  
30 combustion, or optionally part of the collected odorous gases are conducted directly to conventional odorous gas combustion.

8. A method according to any one of the preceding claims, **characterized** in that the at least part of the sulphur compounds of the concentrated odorous gases coming from the Claus combustion are conducted to conventional odorous gas combustion.
- 5 9. A method according to any one of the preceding claims, **characterized** in that at least 10 molar % of the sulphur compounds from the Claus combustion are conducted to combustion in conventional combustion systems.
- 10 10. A method according to any one of the preceding claims, **characterized** in that part of the concentrated odorous gases are lead into a first combustion unit, which comprises one or more Claus system combustion devices (10; 20; 21; 40; 41) and part is lead into the second combustion unit comprising combustion in a soda recovery boiler (3; 53), odorous gas boiler (4; 54), lime sludge reburning kiln (5; 55) or flame (6; 56) or into more than one of these systems.
- 15 11. A method according to any one of the preceding claims, **characterized** in that at least 10 molar %, preferably 30 to 90 molar %, of the collected odorous gases are conducted into one or more Claus system combustion devices (10; 20; 21; 40; 41) for combustion.
- 20 12. A method according to any one of the preceding claims, **characterized** in that the collected odorous gases are combusted in the first combustion unit in the Claus system combustion device (10; 20; 21; 40; 41) and the residual tail gases are conducted to the second combustion unit to be combusted in the soda recovery boiler (3; 53), odorous gas boiler (4; 54), lime sludge reburning kiln (5; 55) or flame (6; 56) or in more than one of
- 25 these systems.
13. A method according to any one of the preceding claims, **characterized** in that 50 to 90 molar %, typically 70 to 85 molar %, of the sulphur of the odorous gases lead into the Claus process are combusted to elemental sulphur.
- 30 14. A method according to any one of the preceding claims, **characterized** in that air, oxygen or a mixture thereof is used in the combustion of odorous gases.

15. A method according to any one of the preceding claims, **characterized** in that the elemental sulphur obtained from the Claus process is further combusted to sulphur dioxide or processed to form sulphuric acid.
- 5 16. A method according to any one of the preceding claims, **characterized** in that at least part of the elemental sulphur is fed back into the process, for example, by adding sulphur to white liquor or feeding the sulphur into the soda recovery boiler.
- 10 17. A method according to any one of the preceding claims, **characterized** in that the odorous gases are collected from the source of concentrated odorous gases of a cooking department or an evaporator plant (1; 2) separately or in combination.
- 15 18. A method according to any one of the preceding claims, **characterized** in that the amount of concentrated odorous gases is increased by means of a suitable method, such as thermal treatment of black liquor.
19. The use of the Claus process for the desulphurization of the circulation of chemicals in a sulphate pulp mill.
- 20 20. An arrangement for the desulphurization of the circulation of chemicals in a sulphate pulp mill, comprising:  
at least one odorous gas combustion unit (10; 20; 21; 40; 41), in which the flow of concentrated odorous gases can be collected and into which it can be conducted from a source of concentrated odorous gases (1, 2) and wherein the reduced sulphur contained in  
25 the concentrated odorous gases can be combusted,  
**characterized** in that  
the combustion unit comprises at least one Claus system combustion device (10; 20; 21; 40; 41), which is provided with a feed inlet (14; 26; 29; 46; 49), which is connected to the source of concentrated odorous gases (1, 2), and with an exhaust outlet (15; 27; 32; 47;  
30 57), through which the oxidized and condensed sulphur compounds of the concentrated odorous gases can be removed from the device as elemental sulphur in a liquid or solid form.

21. An arrangement according to claim 20, **characterized** in that the combustion unit comprises at least two Claus system combustion devices (20; 21; 40; 41) connected in series, whereby the first combustion device comprises a combustion assembly (28; 48) for gaseous, uncondensed sulphur compounds, which is connected to the feed nozzles (29; 49) of the second combustion device.

22. An arrangement according to claim 20 or 21, **characterized** in comprising a first combustion unit (10; 20; 21; 40; 41), which has at least one Claus system combustion device (10; 20; 21; 40; 41), and a second combustion unit, whereby the first unit has an exhaust nozzle (16; 30; 50) for gaseous, uncondensed sulphur compounds, which is connected to the second combustion unit.

23. An arrangement according to any one of claims 20 to 22, **characterized** in that the first combustion unit comprises a Claus system combustion device (10; 20; 21; 40; 41) and a condenser (11; 22; 23; 42; 43) therein.

24. An arrangement according to any one of claims 20 to 23, **characterized** in that the second combustion unit comprises an odorous gas boiler (53), soda recovery boiler (54), lime sludge reburning kiln (55) and/or flame (56).

25. An arrangement according to any one of claims 20 to 24, **characterized** in that the feed nozzle (14; 26; 46) of the first combustion unit is connected to a distribution piece (17; 31; 51) so that part of the concentrated odorous gases can be lead through the distribution piece and past the first combustion unit into the second combustion unit.